

BUREAU OF WATER

South Carolina Department of Health and Environmental Control

SHELLFISH MANAGEMENT AREA 12A

2004 ANNUAL UPDATE

Shellfish Sanitation Program

Water Monitoring, Assessment and Protection Division
Environmental Quality Control - Bureau of Water
2600 Bull Street
Columbia, South Carolina 29201

July 2004



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2004 ANNUAL UPDATE

[Data Thru December 2003]

Shellfish Management Area 12A Shellfish Sanitation Program



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ANNUAL UPDATE
Shellfish Management Area 12A
SCDHEC EQC Bureau of Water

Data Inclusive Dates:

01 / 01 / 01 thru 12 / 31 / 03

Classification Change:

*X Yes No

Shoreline Survey Completed: Yes

(I)ncreased/(D)ecreased/(N)one:

*N Approved

 N Conditionally Approved

 N Restricted

*N Prohibited

Prior Report & Date: Annual -2003

*Prohibited Closure Zone adjusted delineation

SUMMARY

Area 12A appears to be moderately impacted by nonpoint source pollution and routinely exhibits minor water quality oscillations. During the current three-year review period, 12 of the area's 15 shellfish monitoring stations exhibited slightly higher fecal coliform geometric mean and estimated 90th percentile MPN values as compared to the previous review period. These higher fecal coliform concentrations, however, do not represent a substantial increase from the previous review period levels. Upland development is occurring immediately adjacent to the growing area. Impervious surfaces, septic tanks, and farms in close proximity to shellfish growing waters may contribute to lower water quality within the area. Additionally, two livestock pasturelands have been documented along Bohicket Creek. With the exception of a slight adjustment to the Bohicket Marina Prohibited closure zone, it is recommended that Area 12A retain its present classification.

INTRODUCTION

PURPOSE AND SCOPE

The authority to regulate the harvest, sanitation, processing and handling of shellfish is granted to the South Carolina Department of Health and Environmental Control by Section 44-1-140 of the Code of Laws of South Carolina, 1976, as amended. The Department promulgated Regulation 61-47, which provides the rules used to implement this authority and outlines the requirements applied in regulating shellfish sanitation in the State. This regulation specifically addresses classification of shellfish harvesting areas and requires that all areas be examined by sanitary and bacteriological surveys and classified into an appropriate shellfish harvesting classification.

The National Shellfish Sanitation Program (NSSP) Guide For The Control Of Molluscan Shellfish is used by the United States Food and Drug Administration (USFDA) to evaluate state shellfish sanitation programs. The NSSP Model Ordinance requires that a sanitary survey be in place for each growing area prior to its use as a source of shellfish for human consumption and prior to the area's classification as Approved, Conditionally Approved, Restricted, or Conditionally Restricted. Each sanitary survey shall be updated on an annual basis and accurately reflect changes which have occurred within the area. Requirement of the annual reevaluation include, at a minimum, field observations of pollution sources, an analysis of water quality data consisting of the past year's data in combination with appropriate previously collected data, review of reports and effluent samples from pollution sources, and review of performance standards for discharges impacting the growing area. A brief report documenting the findings shall also be provided.

The following criteria consistent with the NSSP Model Ordinance and S. C. Regulation 61-47 are used in establishing shellfish harvesting classifications:

Approved - Growing areas shall be classified Approved when the sanitary survey concludes that fecal material, pathogenic microorganisms, and poisonous or deleterious substances are not present in concentrations which would render shellfish unsafe for human consumption. The Approved area classification shall be designated based upon a sanitary survey, which includes water samples collected from stations in the designated area adjacent to actual or potential sources of pollution. For waters sampled under adverse pollution conditions, the median fecal coliform Most Probable Number (MPN) or the geometric mean MPN shall not exceed fourteen per one hundred milliliters, and not more than ten percent of the samples shall exceed a fecal coliform MPN of forty-three per one hundred milliliters (per five tube decimal dilution). For waters sampled under a systematic random sampling plan, the geometric mean fecal coliform Most Probable Number (MPN) shall not exceed fourteen per one hundred milliliters, and the estimated ninetieth percentile shall not exceed an MPN of forty three (per five tube decimal dilution). Computation of the estimated ninetieth percentile shall be obtained using NSSP Guidelines.

Conditionally Approved - Growing areas may be classified Conditionally Approved when they are subject to temporary conditions of actual or potential pollution. When such events are predictable, as in the malfunction of wastewater treatment facilities, non-point source pollution from rainfall runoff, discharge of a major river, or potential discharges from dock or harbor facilities that may affect water quality, a management plan describing conditions under which harvesting will be allowed shall be adopted by the Department prior to classifying an area as Conditionally Approved. Where appropriate, the management plan for each Conditionally Approved area shall include performance standards for sources of controllable pollution, e.g., wastewater treatment and collection systems, evaluation of each source of pollution, and means of rapidly closing and subsequent reopening areas to shellfish harvesting. Memorandums of agreements shall be a part of these management plans where appropriate.

Restricted - Growing areas shall be classified Restricted when sanitary survey data show a limited degree of pollution or the presence of deleterious or poisonous substances to a degree which

may cause the water quality to fluctuate unpredictably or at such a frequency that a Conditionally Approved classification is not feasible. Shellfish may be harvested from areas classified as Restricted only for the purposes of relaying or depuration and only by special permit issued by the Department and under Department supervision. For Restricted areas to be utilized as a source of shellstock for depuration, or as source water for depuration, the fecal coliform geometric mean MPN of restricted waters sampled under adverse pollution conditions shall not exceed eighty-eight per one hundred milliliters and not more than ten percent of the samples shall exceed a MPN of two hundred and sixty per one hundred milliliters for a five tube decimal dilution test. For waters sampled under a systematic random sampling plan, the fecal coliform geometric mean MPN shall not exceed eighty-eight per one hundred milliliters and the estimated ninetieth percentile shall not exceed an MPN of two hundred and sixty (five tube decimal dilution). Computation of the estimated ninetieth percentile shall be obtained using NSSP guidelines.

Conditionally Restricted - Growing areas may be classified Conditionally Restricted when they are subject to temporary conditions of actual or potential pollution. When such events are predictable, as in the malfunction of wastewater treatment facilities, non-point source pollution from rainfall runoff, discharge of a major river, or potential discharges from dock or harbor facilities that may affect water quality, a management plan describing conditions under which harvesting will be allowed shall be prepared by the Department prior to classifying an area as Conditionally Restricted. Where appropriate, the management plan for each Conditionally Restricted area shall include performance standards for sources of controllable pollution (e.g., wastewater treatment and collection systems and an evaluation of each source of pollution) and description of the means of rapidly closing and subsequent reopening areas to shellfish harvesting. Memorandums of agreements shall be a part of these management plans where appropriate. Shellfish may be harvested from areas classified as Conditionally Restricted only for the purposes of relaying or depuration and only by permit issued by the Department and under Department supervision. For Conditionally Restricted areas to be utilized as a source of shellstock for depuration, the fecal coliform geometric mean MPN of Conditionally Restricted waters sampled under adverse pollution conditions shall not exceed eighty-eight per one hundred milliliters and not more than ten percent of the samples shall exceed a MPN of two hundred and sixty per one hundred milliliters for a five tube decimal dilution test. For waters sampled under a systematic random sampling plan, the fecal coliform geometric mean MPN shall not exceed eighty-eight per one hundred milliliters and the estimated ninetieth percentile shall not exceed an MPN of two hundred and sixty (five tube decimal dilution). Computation of the estimated ninetieth percentile shall be obtained using NSSP guidelines.

Prohibited - Growing areas are classified Prohibited if there is no current sanitary survey or if the sanitary survey or monitoring data show unsafe levels of fecal material, pathogenic microorganisms, or poisonous or deleterious substances in the growing area or indicate that such substances could potentially reach quantities which could render shellfish unfit or unsafe for human consumption.

BACKGROUND INFORMATION

This sanitary survey evaluates the current harvesting classification of shellfish growing waters

designated as Shellfish Management Area 12A (Area 12A). Area 12A consists of approximately 8,292 acres of shellfish growing area habitat located in Charleston County, South Carolina. The area consists of Adams, Bohicket, Church, Fickling, New Cut, Pine, Privateer and Raven Point Creeks. Area 12A is bounded to the east by Johns Island and to the north by Bohicket Road and the Stono River. The western border is a line, passing through Wadmalaw Island, starting at Goshen Point and ending on the western side of Adams Creek. The southern boundary is the North Edisto River.

The harvesting classifications of Area 12A prior to this sanitary survey were as follows:

Prohibited: (Administrative closure)

1. Those waters extending 1,960 feet from the Bohicket Marina in Bohicket Creek;
2. Those waters extending 1,000 feet from both the Cherry Point Seafood and East Coast Seafood commercial docks in Bohicket Creek;
3. Those waters extending 1,000 feet from the Adams Creek commercial docks in Adams Creek.

Restricted:

1. Those waters of Church Creek and all adjacent marshland and creeks from New Cut (Station 41) to Bohicket Creek;
2. Those waters of Bohicket Creek and all adjacent marshland and creeks from Church Creek southward to the Administrative closure around the Bohicket Marina (Station 31).

Approved: All other waters in Area 12A.

The shellfish industry in South Carolina is based primarily on the harvest of the eastern oyster (*Crassostrea virginica*) and hard clams, which include both the northern clam (*Mercenaria mercenaria*) and several small populations of the southern clam (*Mercenaria campechiensis*). Areas in South Carolina designated for commercial harvest by the South Carolina Department of Natural Resources (SCDNR) include State shellfish grounds, culture permits, and Kings Grant areas. The ribbed mussel (*Geukensia demissa*) is also harvested in South Carolina. It is primarily gathered on a small scale by the general public for recreational harvest. The South Carolina Department of Health and Environmental Control will disallow the harvesting of shellfish within Area 12A, for direct marketing purposes, from the restricted waters listed below in the Recommendations.

There are two State Shellfish Grounds (S) within Area 12A. S-172 (New Cut Creek) is currently in the Approved status. Most of S-187 (Bohicket Creek) is located within Restricted waters. There are two culture permits (private leases) within the area.

The shellfish-harvesting season in South Carolina normally extends from mid-September through mid-May. The South Carolina Department of Natural Resources (SCDNR) has the authority to alter the shellfish-harvesting season for resource management purposes and grant permits for year-round mariculture operations. Additionally, the South Carolina Department of Health and Environmental

Control has the authority to prohibit shellfish harvesting when necessary to ensure that shellfish harvested in South Carolina waters are safe for human consumption.

POLLUTION SOURCE SURVEY

CHANGES IN POLLUTION SOURCES

No “substantial” changes in pollution sources have occurred in Area 12A since the 2003 report.

SURVEY PROCEDURES

Shoreline surveys of Area 12A were conducted by the Trident District Shellfish Sanitation staff, by watercraft, vehicle and on foot, during the survey period and are ongoing. Extensive visual examinations of lands adjacent to the waters of Area 12A were conducted to determine potential sources of pollution entering shellfish growing waters.

POINT SOURCE POLLUTION

- A. Municipal and Community Waste Treatment Facilities** - There are no permitted wastewater facilities within Area 12A. The closest waste treatment facilities are located in Area 11 near the southern portion of Bohicket Creek. Both of these Area 11 facilities have been issued ‘no-discharge’ land application permits. One is on Kiawah Island (ND0017361) and the other is on Seabrook Island (ND0063347).
- B. Industrial Waste (Discharges)** - There are no permitted industrial wastewater discharges located within the boundaries of Area 12A.
- C. Marinas** – S.C. Regulation 61-47, Shellfish defines *Marina* as “any water area with a structure (docks, basin, floating docks, etc.) which is: 1) used for docking or otherwise mooring vessels; and, 2) constructed to provide temporary or permanent docking space for more than ten boats, or has more than 200 linear feet of docking space. Bohicket Marina is located approximately four miles from the North Edisto River in Bohicket Creek. The marina offers 186 wet slips and another 100 dry storage slips in a rack system. Marina occupants have access to wastewater pump-out facilities. A Prohibited closure zone extends the full breadth of Bohicket Creek, approximately 1956 feet upstream and downstream, as measured from the centermost marina dock. This represents a correction to the previous delineation.

Three commercial fishery marina facilities are located within Area 12A. Cherry Point Seafood and East coast Seafood docks are located on Bohicket Creek, approximately two and three miles, respectively, from the North Edisto River. Additionally, Adams Creek Marina is located on Adams Creek, a tributary of Bohicket Creek located approximately one-half mile from the North Edisto River. Each of these facilities typically accommodates between 6 and 10 commercial vessels and all are encompassed by administratively Prohibited closure zones.

Marinas are indicated on the map of Potential Pollution Sources.

- D. Radionuclides** - Sources of radionuclides have not been identified within Area 12A, and radionuclide monitoring has not been conducted. No other sources of poisonous or deleterious substances have been identified within the area.

NONPOINT SOURCE POLLUTION

- A. Urban and Suburban Stormwater Runoff** - The shoreline survey conducted in Area 12A revealed the concentration of homes to be consistent throughout the area. Single-family homes continue to be built along both Bohicket and Church Creeks. Two new subdivisions are under construction on Bohicket Creek. Land clearing, associated with this new construction, can accelerate shoreline erosion. Stormwater runoff impacts water quality by transporting fecal coliform bacteria from land to the shellfish growing area.

Stormwater permits may be used as an indicator of land disturbing activities. There are approximately 10 stormwater permits that have been issued within Area 12A. The permits are distributed throughout the area and have been primarily issued to housing subdivisions. The remaining permits are for stormwater control for schools and churches. These areas are depicted on the attached Potential Pollution Source map. The Army Corps of Engineers did not conduct any dredge projects during this past survey period.

The uplands surrounding the shellfish growing waters of Area 12A consist of various soil textures. These have been defined by the United States Department of Agriculture (USDA), Soil Conservation Service (1971) utilizing general classifications and descriptions. Although lands within Area 12A consist of numerous soil types, the area is generally comprised of Kiawah-Seabrook-Dawhoo soils, and occur on low, broad ridges and long, narrow-to-broad depressions in areas roughly parallel with the coastline. The USDA (1971) further describes these soils as "moderately well drained to very poorly drained, nearly level to depressional, sandy soils."

- B. Agricultural Runoff** - There are no permitted agricultural facilities located in Area 12A. However, there are many agricultural crop farms within the area.
- C. Individual Sewage Treatment and Disposal Systems** - Nearly all homes adjacent to shellfish growing waters within Area 12A are served by individual septic systems. Nonpoint source pollution within the area is of major concern. It is difficult to locate these types of sources. No specific septic tank failures have been documented by the Division of Environmental Health (DEH). Each system is required to be inspected by the DEH, Trident Health District, and approved before final installation.
- D. Wildlife and Domestic Animals** - Area 12A supports a large population of domestic animals

attributable to the number of private residences along the shores. While conducting the most recent shoreline survey, it was noted that 2 areas along Bohicket Creek on Wadmalaw Island had livestock populations (approximately 40 animals total). Area 12A also supports a moderate wildlife population: primarily various types of waterfowl and terrestrial mammals such as deer, raccoon, and rodents, as well as marine mammals. The area has an extensive network of small tidal creeks. This creek system provides a possible conduit for animal fecal coliform bacteria to be transported to the adjacent growing waters.

- E. Boat Traffic** - Through much of the year, recreational boat traffic is moderate from the Bohicket Marina to the North Edisto River; and the boat traffic is light from the marina northward. Commercial traffic in Bohicket Creek is light and consists primarily of shrimp boats that are headed off shore. Commercial fisheries boats, ranging in size from 16 to 50 feet, operate as long as the product demand exists. During the recreational shrimp-baiting season, typically extending from mid-September through mid-November, recreational traffic is moderate.
- F. Hydrographic and Habitat Modification** - Hydrographic and habitat modification in estuarine areas requires both State and Federal approval. Portions of the AIWW require maintenance dredging. The U.S. Army Corps of Engineers utilizes designated tracts of land adjacent to the AIWW as dredge spoil sites.
- G. Marine Biotoxins** - Bivalve shellfish contamination from marine biotoxins has not been shown to be a human health concern within Area 12A. The Department participates in a State Task Force on Toxic Algae and maintains a toxic algae emergency response team.

HYDROGRAPHIC AND METEOROLOGICAL CHARACTERISTICS

PHYSIOGRAPHY

Area 12A consists of the waters of Adams, Bohicket, Church, Fickling, New Cut, Pine, Privateer and Raven Point Creeks. The entire area is tidally influenced by the Atlantic Ocean through the North Edisto Inlet. The creeks within the area typically range from 30 to 200 feet in width and average 2 to 25 feet in depth. The entire area is approximately 8.5 miles long (north to south) and 4 miles wide (west to east).

Tides - Tides in Area 12A are semidiurnal, consisting of two low and two high tides occurring each lunar day. Mean tidal ranges in Church Creek at the Maybank Highway Bridge are 6.1 feet during normal tides and 8.5 feet during spring tides. Wind direction and intensity, as well as atmospheric pressure, typically cause variations in predicted tidal ranges.

Rainfall - Precipitation in Area 12A is heaviest during late summer and early autumn. Tropical storms and hurricanes occasionally produce extremely large amounts of rainfall. During winter months

heavy rainfall events are uncommon, yet occasional intense thunderstorms associated with rapidly moving low-pressure systems generate heavy rains. Precipitation rarely occurs in the form of snow or ice. Spring weather patterns may be dynamic with associated thunderstorms and severe weather conditions.

The yearly average for a thirty-year period of rainfall in Charleston, recorded at the Charleston Airport, is 52.14 inches. The 2003 precipitation total recorded at the Edisto Beach State Park was 45.95 inches.

Winds - Prevailing winds along the central portion of the South Carolina coast are from the south and west during spring and summer and from the north during autumn and winter. Wind speeds are generally less than 15 miles per hour (mph); however, strong weather systems may generate winds in excess of 25 mph. Tropical storms and hurricanes occur occasionally.

River Discharges - Freshwater rivers do not discharge directly into Area 12A. Freshwater influence is primarily due to rainfall.

WATER QUALITY STUDIES

DESCRIPTION OF THE PROGRAM

The Department currently utilizes a systematic random sampling (SRS) strategy within Area 12A in lieu of sampling under adverse pollution conditions. In order to comply with NSSP guidelines, a minimum of thirty samples are required to be collected and analyzed from each station during the review period. Sampling dates are computer generated prior to the beginning of each quarterly period thereby insuring random selection with respect to tidal stage and weather. Day of week selection criteria is limited to Mondays, Tuesdays and Wednesdays due to shipping requirements and laboratory manpower constraints. Sample schedules are rarely altered.

During July 1998, an updated shellfish water quality data scheduling and collection procedure was formalized. Samples utilized for classification purposes are limited to those samples collected in accordance with the SRS for a 36-month period beginning January 1 and ending December 31. This allows for a maximum of 36 samples per station, yet provides a six-sample "cushion" (above the NSSP required 30 minimum) for broken sample bottles, lab error, breakdowns, etc. This also allows each annual report's water quality data to meet the requirements for the NSSP Triennial Review sampling criteria.

539 SRS surface water quality samples (<1.0 ft. deep) were collected for bacteriological analyses and classification purposes from 15 active water quality sampling stations in Area 12A during the period 01/01/01 through 12/31/03. Samples were collected in 120 ml amber glass bottles, immediately placed on ice and transported to the South Carolina Department of Health and

Environmental Control's Trident District Environmental Quality Control laboratory at North Charleston, South Carolina. An additional 120 ml water sample was included with each shipment as a temperature control. At the laboratory, sample sets exceeding a 30-hour holding time or containing a temperature control in excess of 10 degrees C. were discarded (APHA, 1970).

Surface water temperatures were measured utilizing hand-held, laboratory-quality calibrated centigrade thermometers. Salinity measurements were measured in the laboratory using an automatic temperature compensated refractometer. Additional field data include ambient air temperature, wind direction, tidal stage and date and time of sampling. Tidal stages were determined by using Nautical Software's *Tides & Currents*, Version 2 (1996).

MONITORING RESULTS

Stations exceeding a fecal coliform geometric mean MPN value of 14 are 14, 20, 29, 38, 39, and 40. No station exceeds a fecal coliform geometric mean MPN value of 88. Stations exceeding a fecal coliform MPN estimated 90th percentile value of 43 are 13, 14, 20, 21, 22, 29, 38, 39, 40, and 46. Stations 14 and 39 exceed an estimated 90th percentile fecal coliform MPN value of 260.

A Fecal Coliform Bacteriological Data Summary Table is included in this report (See Table 2). The fecal coliform bacteriological raw data sheets with data collected between 01/01/01 and 12/31/03 are included following the data summary table.

CONCLUSIONS

Based on review of fecal coliform bacteriological data and the pollution source survey, Area 12A appears to be impacted primarily by non-point source pollution.

NONPOINT SOURCE RUNOFF

Stormwater runoff appears to be the major source of fecal coliform bacteria throughout the area. Domestic and wildstock animal population are likely contributors to excessive fecal coliform levels within the area. Moderate numbers of livestock have been observed along both Bohicket and Church Creeks.

RECOMMENDATIONS

The shoreline survey and bacteriological data review of shellfish growing Area 12A indicate that, with the exception of a slight adjustment in the closure zone surrounding Bohicket Marina, the current classification boundary descriptions are appropriate. The harvesting classification of Area 12A for this sanitary survey are as follows:

Prohibited: (Administrative closure)

1. Those waters of Bohicket Creek, extending approximately 1,956 feet upstream and downstream from the Bohicket Marina in Bohicket Creek, as measured from the centermost dock;
2. Those waters within a radius of approximately 1,000 feet of both the Cherry Point Seafood and East Coast Seafood commercial docks in lower Bohicket Creek;
3. Those waters extending approximately 1,000 feet upstream and downstream from the Adams Creek commercial docks in Adams Creek.

Restricted:

1. Those waters of Church Creek and all adjacent marshland and creeks from New Cut (Station 41) to Bohicket Creek;
2. Those waters of Bohicket Creek and all adjacent marshland and creeks from Church Creek southward to the administrative closure around the Bohicket Marina.

Approved: All other waters in Area 12A.

Station Addition/Deactivation/Modification:

Modification – Station 12A-31 will be shifted slightly westward to correspond with the delineation of the Bohicket Marina closure zone. New Lat/Lon 32-36-15 / 80-09-51.

Analysis of sampling data for Area 12A demonstrates the probability of a significant impact from rainfall exceeding 4.00" in a 24 hour period. Therefore, a precautionary closure of Area 12A will be implemented following rainfall events of greater than 4.00" in a 24 hour period, as measured at the Edisto Beach State Park located on Edisto Island. This methodology is associated with the concept of the Probable Maximum Precipitation (PMP). PMP estimates for the coastal United States have been published in a series of hydro-meteorological reports (HMRs) by the National Weather Service (*National Weather Service*). PMP estimates for South Carolina's growing areas are derived from HMRs 51, 52, and 53 (*National Research Council, 1985*).

REFERENCES

- American Public Health Association, Inc. *Procedures for the bacteriologic examination of sea water and shellfish*, 1970. p. 28-47. In *Recommended procedures for the examination of sea water and shellfish*, 4th ed. Library of Congress, Washington, D.C.
- National Research Council, 1985, “*Safety of Dams - Flood and Earthquake Criteria*” National Academy Press, Washington DC.
- National Shellfish Sanitation Program (NSSP) -- *Guide for the Control of Molluscan Shellfish*, 1997 Revision. U.S. Department of Health and Human Services, Washington, D.C.
- National Weather Service. The National Oceanic and Atmospheric Administration. *Precipitation Frequency Atlas of the Western US: NOAA Atlas II*. Superintendent of Documents, US Government Printing Office - Washington DC.
- United States Department of Agriculture, Soil Conservation Service, 1971. *Soil survey of Charleston County, South Carolina*. In cooperation with South Carolina Agricultural Experiment Station and South Carolina Land Resources Conservation Commission, National Cooperative Soil Survey, Washington, D.C. p. 78.

TABLE #1

**Shellfish Management Area 12A
Water Quality Sampling Stations Description**

<u>Station</u>	<u>Description</u>
09	Confluence of Adams Creek and Bohicket Creek
10	Cherry Point Boat Landing
13	Confluence of Bohicket Creek and Fickling Creek
14	S.C. Hwy 700 Bridge at Church Creek
20	Bohicket Creek opposite Hoopstick Island
21	Opposite old dam behind Rast House Restaurant
22	Bohicket Creek at Boy Scout Camp
29	Confluence of Raven Point Creek and Church Creek
31	Southwest Boundary of Prohibited Area at Bohicket Marina
32	Privateer Creek at fork
38	Drainage discharge one-eighth mile east of power lines, north bank of Church Creek
39	Confluence of Church Creek and small tidal creek approx. 350 yds west S.C. Hwy 700 bridge, north side of Church Creek
40	Pine Creek at first fork
41	Confluence of Church Creek and New Cut
46	Bohicket Creek midway between Stations 21 and 22 at small, unnamed tributary on west bank
(Total 15)	

Figure 1.
Shellfish Management Area 12A
Prior Classification

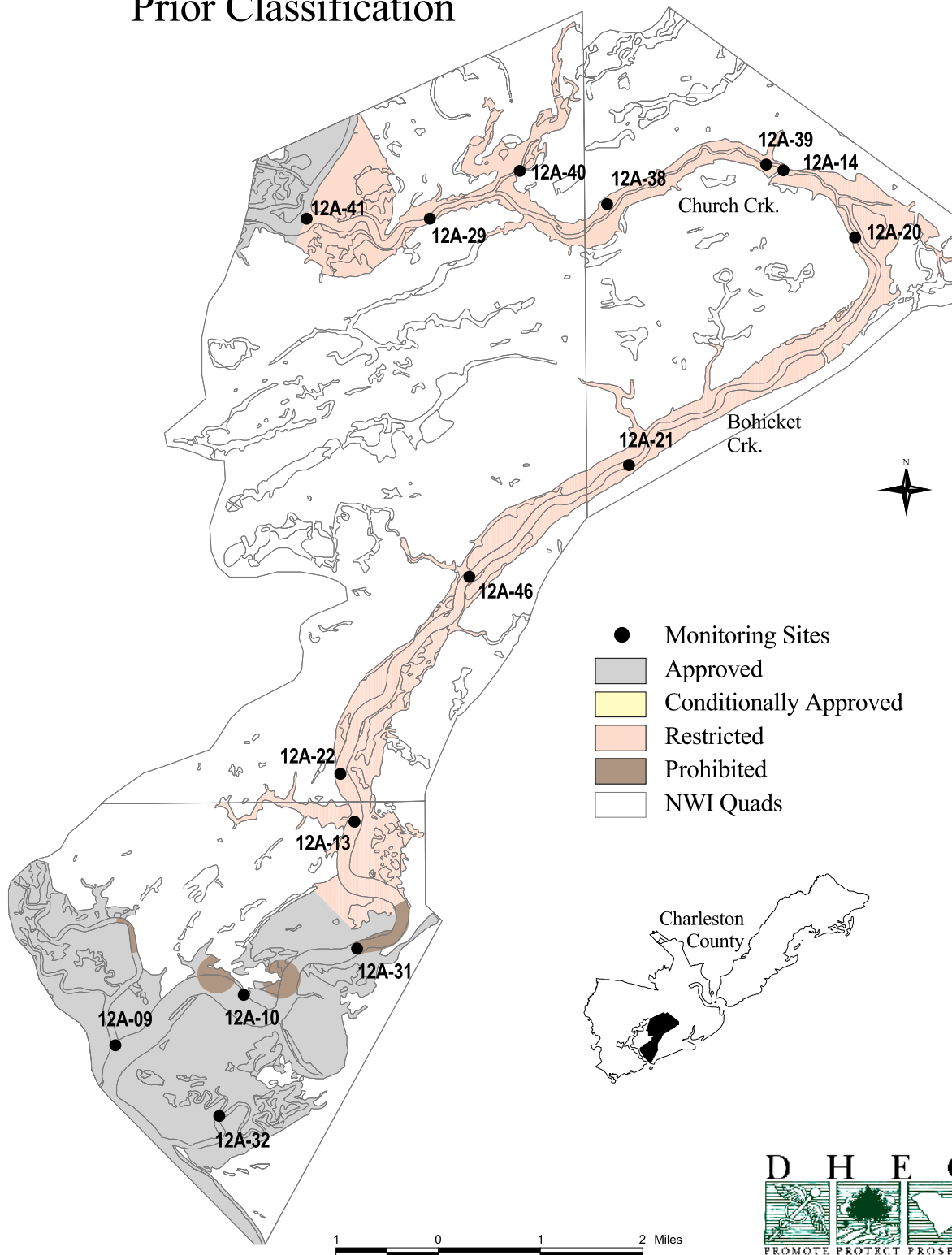


Figure 2.
Shellfish Management Area 12A
Current Classification

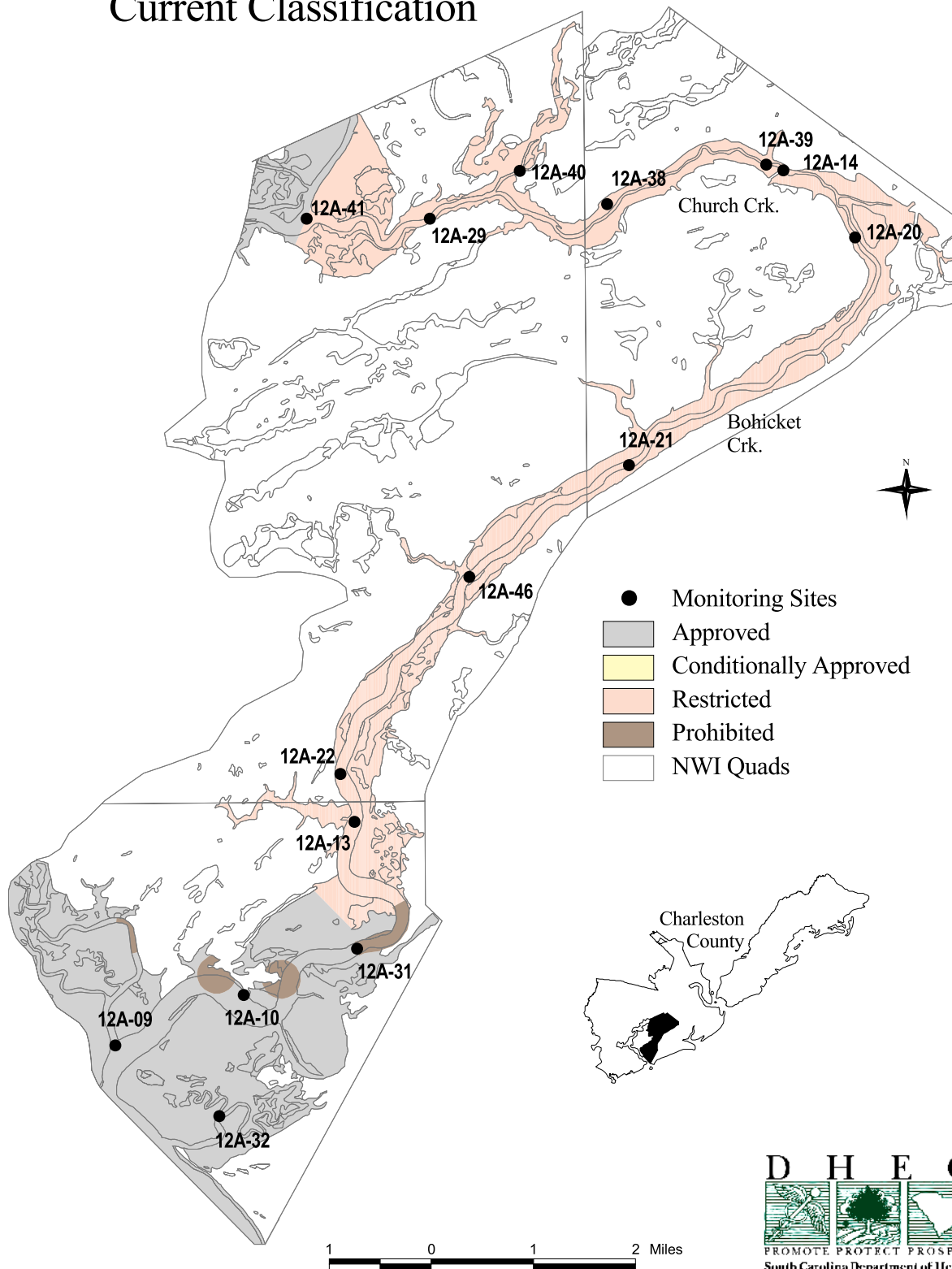


Figure 3.
Shellfish Management Area 12A
Potential Pollution Sources

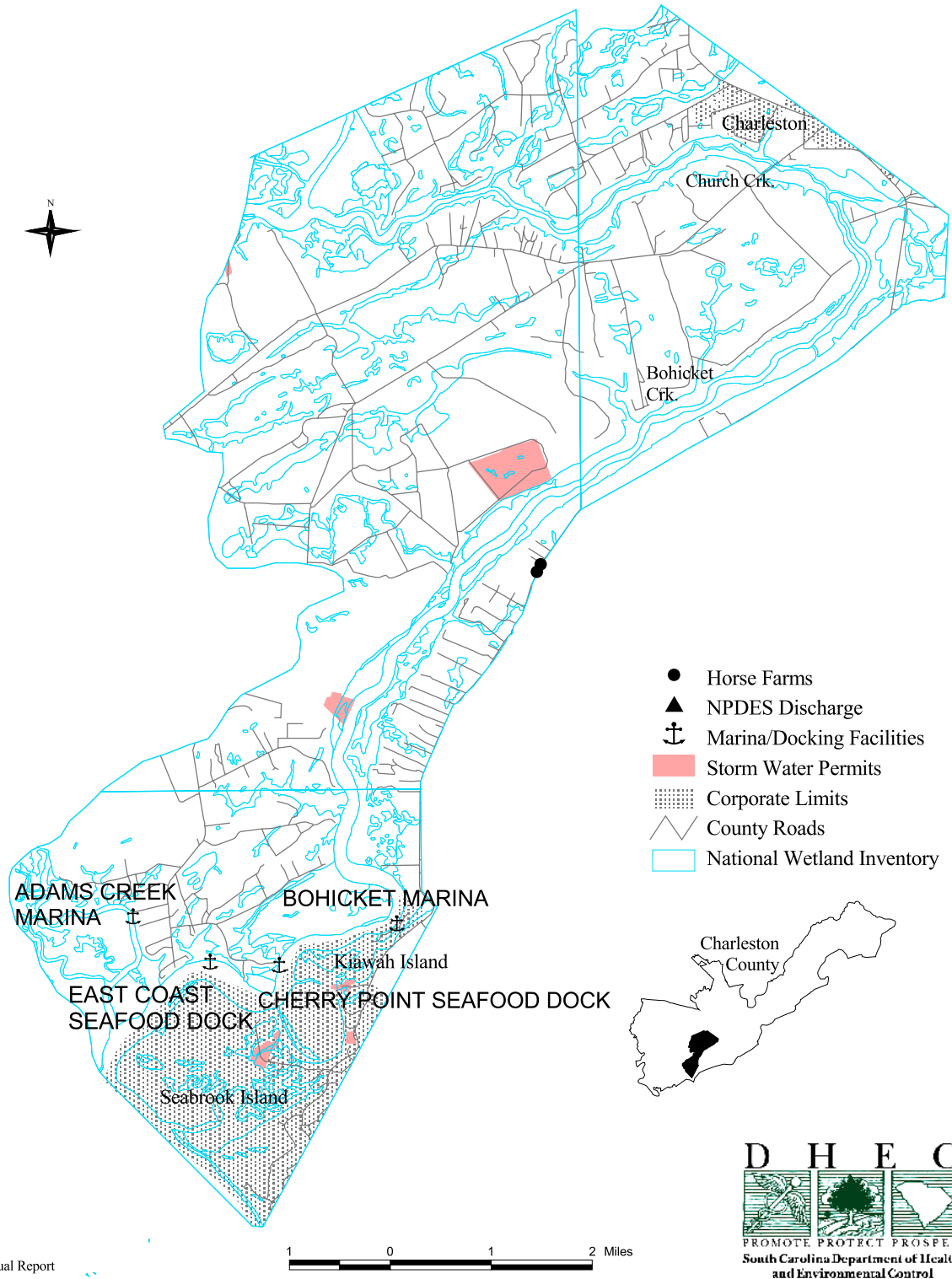


TABLE #2
Shellfish Management Area 12A

FECAL COLIFORM BACTERIOLOGICAL DATA SUMMARY
from Shellfish Water Quality Sampling Stations between

January 1, 2001 and December 31, 2003

Station #	9	10	13	14	20	21	22	29	31	32
SAMPLES	36	36	36	36	36	36	36	36	36	36
GEOMEAN	4.7	3.9	11.1	38.5	23.8	12.9	8.3	23.2	5.0	4.1
90TH %ILE	21	10	74	310	165	70	50	133	15	16
WATER QLTY	A	A	R	RND	R	R	R	R	A	A
CLASSIFICATION	A	A	R	R	R	R	R	R	P	A

Station #	38	39	40	41	46					
SAMPLES	36	36	36	35	36					
GEOMEAN	39.1	50.4	33.0	9.6	10.8					
90TH %ILE	156	410	230	39	44					
WATER QLTY	R	RND	R	A	R					
CLASSIFICATION	R	R	R	R	R					

Station #										
SAMPLES										
GEOMEAN										
90TH %ILE										
WATER QLTY										
CLASSIFICATION										

A - Approved CA - Conditionally Approved R - Restricted
RND - Restricted/No Depuration P - Prohibited

TABLE #3

Water Quality Sampling Stations Data

Shellfish Management Area 12A

BACTERIOLOGICAL DATA

Data for each shellfish station listed in this report's "Fecal Coliform Bacteriological Data Summary Table" and in other shellfish reports, can be obtained through South Carolina's Department of Health and Environmental Control - Freedom of Information office at the address below.

Freedom of Information
2600 Bull Street
Columbia, SC 29201

Any explanation or clarity needed on the report's content can be obtained by contacting the preparer(s), and/or reviewer(s) listed on the cover page.

TABLE #4

Rainfall Data

Shellfish Management Area 12A

SOURCE:

SC State Climatologist Office, Columbia, South Carolina.
Edisto Island (3-SW) Station (382730)

ANNUAL TABLE OF DAILY RAINFALL DATA

*SOURCE: South Carolina State Climatology Office
Columbia, SC (Edisto Island - Station #382730 / 3-SW)*

2001	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1st	0.00	0.00	0.02	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00
2nd	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	1.61	0.00	0.00	0.00
3rd	0.00	0.10	0.36	0.00	0.00	0.73	--	0.00	0.62	0.00	0.00	0.00
4th	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.02	0.00	0.00	0.00
5th	0.00	0.00	0.00	0.00	0.00	0.00	--	0.12	0.25	0.00	0.00	0.00
6th	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.01	0.00	0.00
7th	0.05	0.00	0.00	0.00	0.03	0.71	--	0.00	0.00	0.00	0.00	0.00
8th	0.16	0.00	0.00	0.00	0.00	0.10	--	0.00	0.03	0.00	0.00	0.39
9th	0.00	0.00	0.00	0.00	0.00	0.25	--	0.05	0.00	0.00	0.00	0.00
10th	0.00	0.10	0.00	0.00	0.00	0.51	--	0.00	0.00	0.00	--	1.77
11th	0.12	0.53	0.00	0.00	0.00	0.10	--	0.00	0.00	0.00	0.00	0.00
12th	0.00	0.00	0.85	0.00	0.03	0.00	0.22	0.00	0.00	0.00	0.00	0.05
13th	0.00	0.00	0.00	0.10	0.00	--	0.15	0.43	0.35	0.00	0.00	0.10
14th	0.15	0.00	0.17	0.00	0.00	0.10	0.00	0.15	0.25	0.45	0.00	0.00
15th	0.00	0.00	0.62	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
16th	0.00	0.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
17th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
18th	0.10	0.00	0.00	0.00	0.00	0.00	0.00	1.25	0.00	0.00	0.00	0.00
19th	0.22	0.00	0.52	0.00	0.00	0.08	0.00	0.22	0.00	0.00	0.00	0.00
20th	0.00	0.00	1.20	0.00	0.00	0.20	2.00	1.78	0.25	0.00	0.00	0.00
21st	0.00	0.13	0.00	0.00	0.00	0.25	0.10	0.18	0.00	0.00	0.00	0.00
22nd	0.42	0.00	0.00	0.00	1.35	0.05	0.00	0.00	0.00	0.00	0.00	0.00
23rd	0.00	0.00	0.00	0.00	0.00	--	0.46	0.00	0.01	0.00	0.00	0.00
24th	0.00	0.00	0.05	0.00	0.00	0.00	0.06	0.00	0.65	0.00	0.34	0.00
25th	0.00	0.32	0.09	0.35	0.00	--	0.00	0.00	0.02	0.00	0.00	0.00
26th	0.00	0.00	0.00	0.00	0.50	--	0.00	0.00	0.00	0.00	0.00	0.00
27th	0.00	0.04	0.00	0.00	0.00	0.00	1.24	0.00	0.00	0.00	0.00	0.00
28th	0.00	0.00	0.22	0.00	0.00	0.00	0.20	0.00	0.00	0.00	0.00	0.00
29th	0.00		0.20	0.00	0.00	0.00	--	0.00	0.00	--	0.00	0.00
30th	0.13		0.00	0.00	0.00	0.00	1.15	--	0.00	0.00	0.00	0.00
31st	0.00		0.00		0.00		0.00	1.55		0.00		0.00

(Monthly Figures)

Year's Rainfall Total:

31.08

SUM	1.35	1.39	4.30	0.57	1.91	3.08	5.58	5.73	4.06	0.46	0.34	2.31
MAX	0.42	0.53	1.20	0.35	1.35	0.73	2.00	1.78	1.61	0.45	0.34	1.77
MIN	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
AVG	0.04	0.05	0.14	0.02	0.06	0.12	0.29	0.19	0.14	0.02	0.01	0.07

Note: "--" denotes missing data
(Shellfish Management Areas 12A, 12B, 13)

ANNUAL TABLE OF DAILY RAINFALL DATA

*SOURCE: South Carolina State Climatology Office
Columbia, SC (Edisto Island - Station #382730 / 3-SW)*

2002	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1st	0.00	0.00	0.27	0.00	0.00	0.00	0.00	0.08	0.05	0.00	0.00	0.00
2nd	0.40	0.00	1.75	0.00	0.00	0.00	0.00	0.00	0.90	0.00	0.00	0.00
3rd	0.00	0.00	0.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.92	0.00	--	0.10	0.00
5th	0.00	0.01	0.00	0.00	0.20	0.00	0.10	0.00	0.00	--	0.68	0.00
6th	0.00	1.25	0.00	0.00	0.00	0.00	0.15	0.17	0.00	0.00	0.00	0.00
7th	0.00	0.30	0.00	0.00	0.00	1.80	0.00	0.00	0.00	0.00	0.00	0.00
8th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.57	0.00	0.00
9th	0.00	0.13	0.00	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.12	1.23
10th	0.00	0.27	0.00	0.75	0.00	--	0.00	0.00	0.00	6.35	1.14	0.18
11th	0.50	0.00	0.00	0.00	0.00	0.00	0.10	0.00	0.00	0.20	0.70	0.00
12th	0.95	0.00	0.25	0.03	0.00	0.00	0.00	0.00	0.00	0.00	--	0.73
13th	0.00	0.00	0.00	0.00	0.06	--	0.70	0.00	0.00	0.00	1.12	0.34
14th	0.37	--	0.00	0.00	0.00	0.00	0.00	0.10	0.33	1.74	0.00	0.00
15th	0.00	0.10	0.00	0.00	0.00	0.10	0.00	0.00	1.03	0.10	0.00	0.00
16th	0.00	0.00	0.00	0.00	0.00	0.00	0.28	0.00	0.00	0.00	0.84	0.00
17th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00
18th	0.00	0.00	0.00	0.00	1.29	0.40	0.00	0.00	0.00	0.00	0.00	0.57
19th	0.07	0.00	--	0.00	0.37	--	0.00	0.00	0.00	0.00	0.00	0.11
20th	0.00	0.25	--	0.00	0.00	0.66	0.00	0.00	0.00	0.00	0.00	0.00
21st	0.00	0.00	0.42	0.00	0.00	0.95	0.00	0.00	0.00	0.09	0.00	0.00
22nd	0.00	0.10	0.00	0.00	0.00	1.90	0.50	0.00	0.28	0.00	0.00	0.00
23rd	0.15	0.00	0.00	0.00	0.00	0.82	0.20	0.00	0.02	0.02	0.00	0.00
24th	0.10	0.00	0.00	0.00	0.00	1.75	0.00	0.95	0.17	0.12	0.00	1.19
25th	0.22	0.00	0.00	0.00	0.00	1.35	0.00	1.75	1.77	0.00	0.00	0.00
26th	0.04	0.08	0.17	0.10	0.00	0.15	0.00	0.63	0.00	--	0.00	0.00
27th	0.00	0.00	0.00	--	0.00	0.00	0.00	0.80	0.00	0.00	0.00	0.00
28th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.88	0.00	0.00	0.00	0.00
29th	0.00		0.00	0.00	0.00	0.00	0.00	1.78	0.13	1.59	0.00	0.00
30th	0.00		0.00	0.00	0.00	0.00	0.00	1.05	0.00	0.00	0.00	0.00
31st	0.00		0.56		0.00		0.22	0.55		--		0.00
(Monthly Figures)												Year's Rainfall Total: 58.35
SUM	2.80	2.49	3.71	1.13	1.92	9.88	2.25	9.66	4.68	10.78	4.70	4.35
MAX	0.95	1.25	1.75	0.75	1.29	1.90	0.70	1.78	1.77	6.35	1.14	1.23
MIN	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
AVG	0.09	0.09	0.13	0.04	0.06	0.37	0.07	0.31	0.16	0.40	0.17	0.14

Note:"--" denotes missing data
(Shellfish Management Areas 12A, 12B, 13)

ANNUAL TABLE OF DAILY RAINFALL DATA

*SOURCE: South Carolina State Climatology Office
Columbia, SC (Edisto Island - Station #382730 / 3-SW)*

2003	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1st	0.62	0.00	0.53	0.00	0.00	0.00	0.52	0.00	1.35	0.00	0.00	--
2nd	0.00	0.00	0.53	0.00	0.44	0.00	0.00	0.20	0.00	0.00	0.00	0.00
3rd	--	0.00	0.30	0.00	0.00	0.30	--	0.00	0.00	0.00	0.10	0.00
4th	0.00	0.00	0.05	0.00	0.00	0.73	0.00	0.40	--	0.00	0.10	0.85
5th	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.00	1.80	0.00	0.00	0.40
6th	0.00	0.35	0.92	0.00	1.62	0.12	0.00	--	0.74	0.00		0.00
7th	0.00	0.01	0.24	1.58	0.00	0.33	0.73	0.14	0.40	--		--
8th	0.00	0.00	0.24	2.15	0.00	1.58	0.00	0.00	0.07	0.50	0.00	
9th	0.00	0.15	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10th	0.00	0.00	0.00	0.13	0.00	0.00	0.00	--	0.00	0.00	0.00	
11th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00		0.00	--
12th	0.03	0.00	0.00	0.00	0.00	0.64	0.36	0.00	0.00	0.00	0.00	--
13th	0.00	0.00	0.51	0.00	0.00	0.00	0.34	--	0.00	0.00	0.00	--
14th	0.00	0.00	0.57	0.00	0.01	0.00	1.20	--	0.00	0.03	0.00	0.25
15th	0.00	0.00	0.03	0.00	0.85	0.00	--	--	0.00	0.00	0.00	
16th	0.00	1.09	0.03	--	0.00	0.15	--	0.09	0.00	0.00	0.00	
17th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
18th	0.00	0.00	0.59	0.00	0.92	0.20	0.00	0.47	0.00	0.00	0.00	
19th	0.00	0.00	0.19	0.00	0.00	0.00	1.31	--	0.00		0.50	0.00
20th	0.00	0.00	0.56	--	0.00	0.00	0.00	0.18	0.00	0.00	0.00	0.00
21st	0.00	0.04	0.56	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00	0.00
22nd	0.24	0.52	--	0.00	2.22	0.00	--	0.00	0.35	0.00		0.00
23rd	0.00	0.00	0.00	0.00	0.15	0.00	1.22	0.00	0.00	0.00	0.00	0.00
24th	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.00	--
25th	0.00	0.00	0.00	1.23	0.00	0.00	0.83	--	0.00	0.00	0.00	0.00
26th	0.00	0.37	0.00	0.00	0.35	0.00	0.29	--	0.03	--	0.00	0.00
27th	0.00	0.00	0.01	0.00	0.00	0.00	0.02	--	0.17	0.30	0.00	0.00
28th	0.00	0.00	0.01	0.00	0.00	1.90	0.00	0.00	0.00	1.80	0.00	0.00
29th	0.00		0.12	0.00	0.00	0.13	0.00	0.00	0.00	0.00	0.00	0.00
30th	0.00		0.22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
31st	0.00		0.22		0.00		0.00	0.00		0.00		--
(Monthly Figures)			Year's Rainfall Total:									45.95
SUM	0.89	2.53	6.48	5.29	6.56	6.08	6.90	1.48	4.91	2.63	0.70	1.50
MAX	0.62	1.09	0.92	2.15	2.22	1.90	1.31	0.47	1.80	1.80	0.50	0.85
MIN	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
AVG	0.03	0.09	0.22	0.19	0.21	0.20	0.26	0.07	0.18	0.10	0.03	0.08

Note: "--" denotes missing data
(Shellfish Management Areas 12A, 12B, 13)